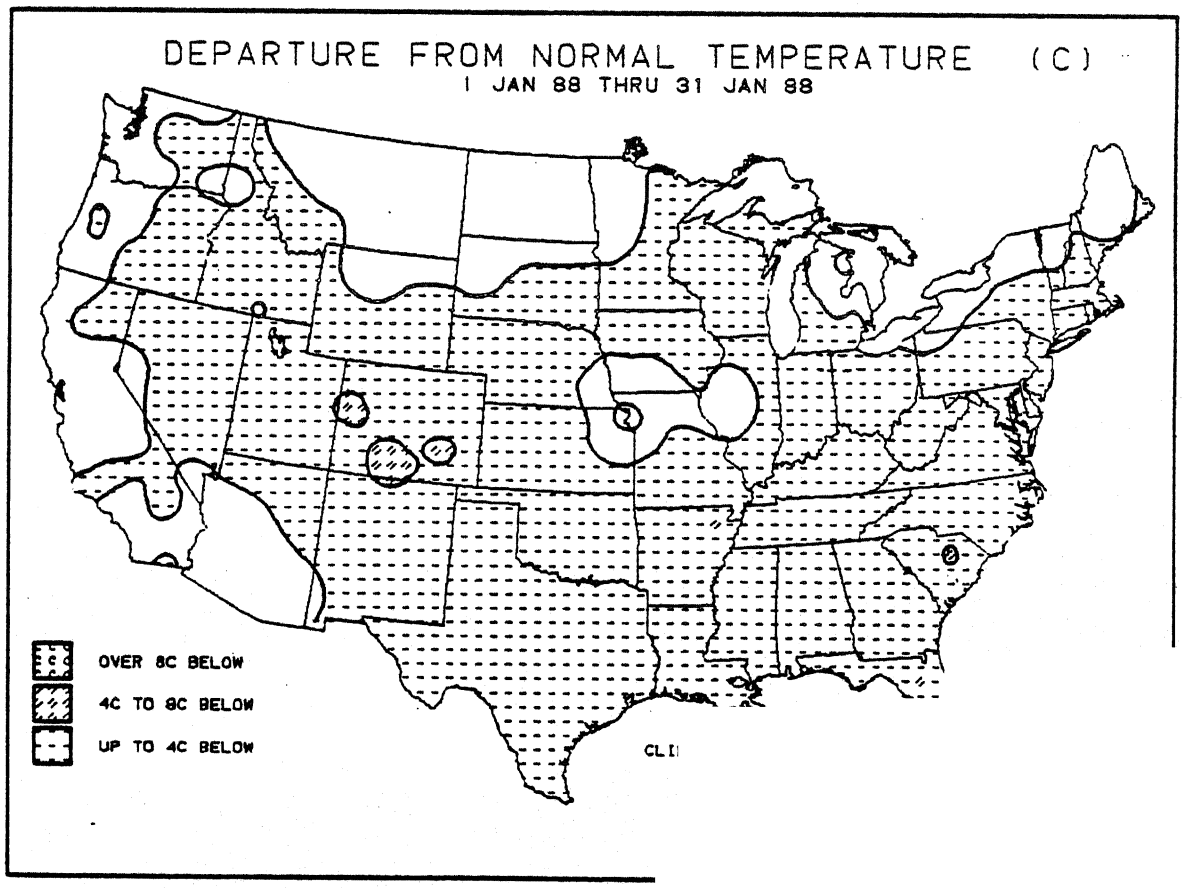
CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

No. 88/06 Washington, DC February 6, 1988



IN SHARP CONTRAST TO DECEMBER,
EXPERIENCED UNUSUALLY COLD COND

NOAA - NATIONAL WEATHER SERVICE -

GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JANUARY 18, 1992

1. *Western North America:*

MILD WEATHER RETREATS.

Arctic air invaded much of south-central Canada and the north-central United States; however, abnormally high temperatures, up to 11°C above normal, persisted in southeastern Alaska and northwestern Canada [6 weeks].

2. *Southern United States:*

COLD, WET, AND SNOW.

A major winter storm dumped up to 30 cm of snow on parts of the South from north-central Texas to South Carolina. Farther south, heavy rains of 85 to 200 mm deluged the immediate Gulf Coast [14 weeks]. Temperatures averaged as much as 4°C below normal last week [Episodic Event].

3. *Lower Great Lakes:*

HEAVY SNOW BLANKETS REGION.

Bitterly cold air crossing the abnormally mild Great Lakes yielded heavy snow, with more than 60 cm accumulating at some location. Very low visibilities, aggravated by blowing and drifting snow, snarled transportation and closed schools as high winds whipped the region [Episodic Events].

4. *Northern Argentina:*

MORE DOWNPOURS IN THE AREA.

Heavy rains, exceeding 120 mm in spots, again deluged much of northern Argentina, where rainfall totals since mid-December were two to four times the amount expecte during the period [8 weeks].

5. *Middle East:*

EXCESSIVE RAINS CONTINUE.

After a brief respite, moderate to heavy precipitatio returned to the region. Parts of northwestern Syria recorde 50 to 90 mm [7 weeks].

6. *Middle East and Northern Africa:*

CHILLY WEATHER REMAINS ENTRENCHED.

Weekly temperatures averaged as much as 9°C below norma in Turkey while weekly departures of -2°C to -4°C afflicte much of Saudi Arabia and the African Sahel [8 weeks].

7. *Southern Africa:*

DRYNESS CONTINUES.

Little or no precipitation fell in much of southern Afric where moisture deficits since early December approached 24 mm in Zimbabwe and 265 mm in Mozambique [7 weeks].

8. *Northern and Eastern Australia:*

MOISTURE DEFICITS GROW.

Abnormally dry weather again spread across much of th region as moisture deficits during the last six weeks exceede 250 mm at some locations [6 weeks]. Temperatures, climbi towards 36°C and averaging up to 5°C above norma aggravated the unusually dry conditions [2 weeks].

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JANUARY 12 - 18, 1992

Wintry weather affected a large portion of the lower 48 states as the first significant blast of Arctic air of the Winter plunged southward out of Canada and into the central and eastern U.S. Strong northerly winds combined with the bitter cold to produce dangerous wind chills from the northern Plains to the Northeast. On Tuesday, the wind chill at Fargo plunged to -71°F. Sub-zero readings dipped as far south as the central Plains, and record daily lows were established from the northern Rockies to the deep South. Heavy snow fell from the southern Rockies to New England late and, late in the week across parts of the deep South. Nearly a foot of snow (the heaviest snowfall in ten years) buried Detroit, MI, closing the Detroit City Airport on Tuesday and forcing the cancellation or delay of numerous flights. Snow accompanied by thunder was reported across eastern lower Michigan on Tuesday. Strong winds caused blowing and drifting snow through much of the Midwest, generating white-out conditions in parts of Illinois. Farther east, lake-effect squalls buried parts of western New York with up to 30 inches of snow on Saturday. In the South, heavy snow fell in a narrow band from west-central Texas to the south Atlantic coast as the week ended. More than half a foot of snow blanketed parts of Texas, Arkansas, Alabama and Georgia. Meanwhile, thunderstorms rocked the Southwest, the Gulf Coast, and southern New England, generating heavy rain, strong winds, and a few tornadoes. One tornado touched down near Lucedale, AL, destroying two homes while another demolished a barn near Harrisburg, PA. Strong wind gusts caused numerous power outages from Indiana to Vermont. Elsewhere, heavy rain inundated southeast Texas and southern Louisiana, with over 8 inches measured at Port Arthur, TX. Heavy rain and high winds also buffeted the Hawaiian Islands, causing flash flooding on the island of Maui.

The week commenced with a developing winter storm in the southern Rockies. Nearly a foot of snow fell from Utah to Colorado. Wind gusts to 40 mph generated blowing and drifting snow and wind chills to -20°F in Colorado. To the south, strong thunderstorm wind gusts damaged trees and roofs in Tucson, AZ. The storm and trailing cold front later moved across the southern tier of states, spreading snow across northern Texas, Oklahoma, and Arkansas while severe thunderstorms battered the lower Mississippi Valley and deep South. Nearly two inches of rain soaked parts of Georgia and South Carolina on Monday. Warm, moist air streamed northward ahead of the storm system, producing record daily highs in southern New England as readings soared into the sixties. To the north and west of the low, wintry weather prevailed as Arctic air was funnelled southward out of Canada. Heavy snow, bitter cold, and strong wind gusts produced blizzard-like conditions in the Midwest and Great Lakes. Severe thunderstorms erupted along and ahead of the leading edge of Arctic air as it pushed into the East. Thunderstorms packing hail and wind gusts over 60 mph tore through the central Appalachians and mid-Atlantic, downing trees and power lines. Farther west, an "Alberta Clipper" tracked southeastward into the northern Plains, spreading light snow across the Dakotas.

During the last half of the week, the storm in the East exited northern New England as the trailing cold front pushed off the Atlantic coast. Meanwhile the storm in the northern Plains rapidly moved east, forcing Arctic air to plunge southward out of Canada to the Gulf Coast by Friday morning. Sub-freezing lows were reported from northern Florida to central Texas. Strong winds and frigid air continued to produce bitter wind chills in the northern tier of states and lake-effect snow squalls in the Great Lakes. Toward the weekend, a low in the Gulf of Mexico generated heavy rain along the west-central Gulf coast and heavy, wet snow through the interior deep South. More than 4 inches of rain soaked Port Arthur, TX on Friday and Saturday while snow fell farther north in a band from Texas to the south Atlantic Coast. Parts of Atlanta, GA measured more than 8 inches of snow from the storm. In Alaska, blizzard conditions affected the Arctic Coast while unusually mild weather prevailed across southern Alaska, with Anchorage establishing a daily record high of 46°F on Friday.

According to the River Forecast Centers, the greatest weekly precipitation totals (more than 2 inches) occurred in a band from eastern Texas to the south Atlantic Coast, across northern Florida, at scattered locations in the Ohio Valley and Hawaii, and in southeastern Alaska (Table 1). Light to moderate amounts were recorded in New England, the mid-Atlantic, the remainders of Florida and the Ohio Valley, the Great Lakes, the middle Mississippi Valley, the southern half of the Great Plains, Rockies, the Southwest, the western portions of Washington and Oregon, central and southwestern Alaska, and the remainder of the Hawaiian Islands. Little or no precipitation was measured in the upper Midwest, the northern half of the Great Plains, the Great Basin, California, and south-central and extreme northern Alaska.

Abnormally warm weather was restricted to south-central New England and the coastal mid-Atlantic, the western Ohio Valley, the northern Great Plains, most of Montana, and the Pacific Northwest (Table 2). Weekly departures between +4°F and +11°F were common from Washington to western Iowa while near to slightly above normal temperatures prevailed across the remaining areas. Portions of the central and eastern U.S. recorded huge temperature swings of 20°C to 35°C as mild air early was replaced by the bitter Arctic chill by midweek (see Figure 1). In Alaska, unusually mild weather dominated most of the state, with weekly departures to +26°F reported at Gulkana, and near to slightly above normal temperatures prevailed across Hawaii.

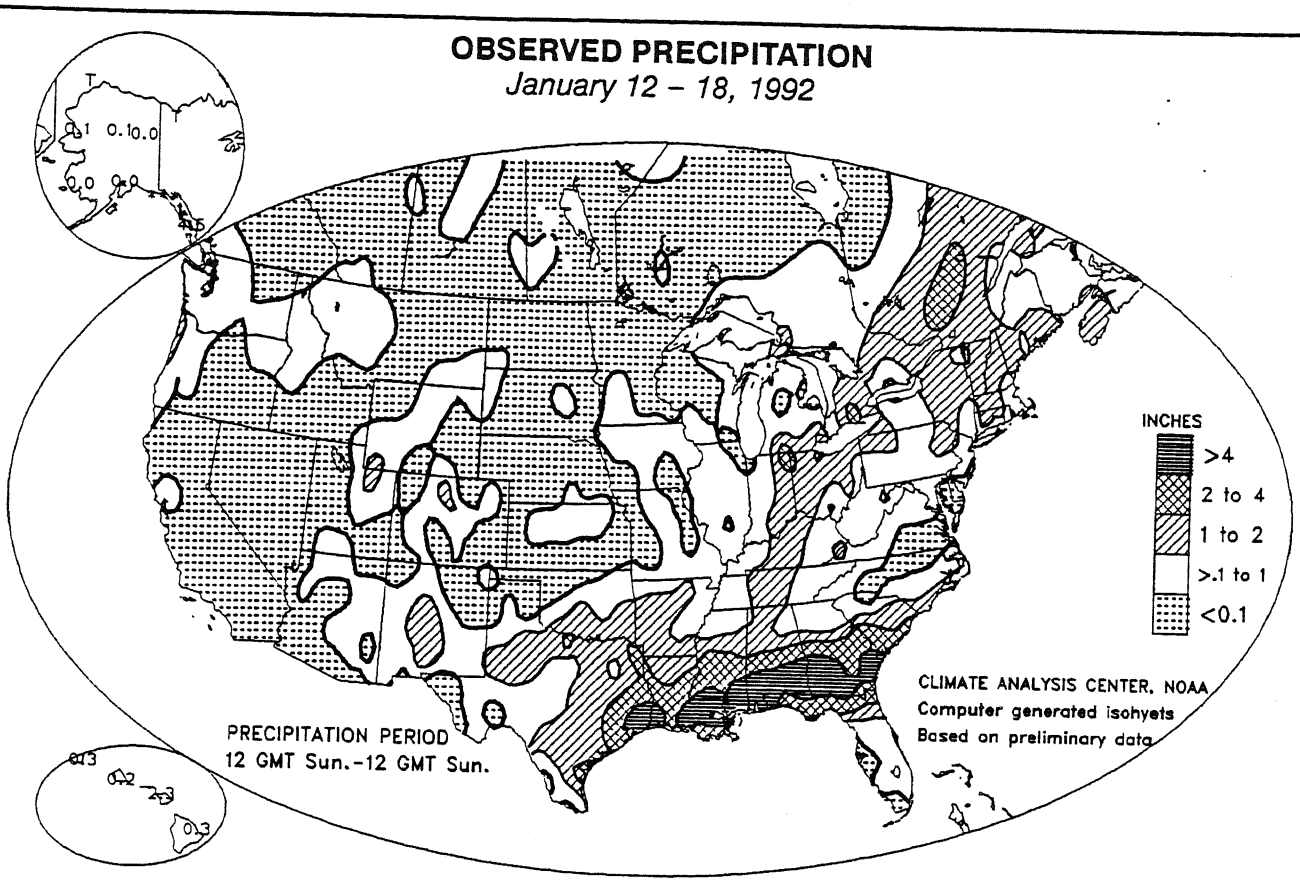
Colder than normal conditions prevailed through most of the lower 48 states (Table 3). Weekly departures of -8°F to -12°F were observed across most of Texas, the central and southern Rockies, and scattered locations in California, the Southwest, the Gulf Coast, the Mississippi and Ohio Valleys, and western Maine. Departures of -3°F to -7°F were common across northern New England, the Great Lakes, the extreme upper Midwest, the Deep South, and the remainders of Texas, the Rockies, the Southwest, and California.

TABLE 1. *SELECTED STATIONS WITH 4.00 OR MORE INCHES OF PRECIPITATION DURING THE WEEK OF JANUARY 12 - 18, 1992*

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
YAKUTAT, AK	10.49	HOUSTON, TX	4.71
PORT ARTHUR, TX	8.24	BATON ROUGE, LA	4.56
MILTON/WHITING NAS, FL	7.50	BILOXI/KEESLER AFB, MS	4.41
MOBILE, AL	5.95	PENSACOLA, FL	4.37
DOTHAN, AL	5.62	VALDOSTA, GA	4.24
KODIAK, AK	5.52	LAFAYETTE, LA	4.24
MCCOMB, MS	5.46	SAVANNAH/HUNTER AFB, GA	4.22
WAYCROSS, GA	5.19	OZARK/CAIRNS AFB, AL	4.20
ANNETTE ISLAND, AK	5.14	COLUMBUS, GA	4.17
VALDEZ, AK	4.85	LAKE CHARLES, LA	4.10
ALBANY, GA	4.73	NEW ORLEANS/LAKE FRONT, LA	4.04

OBSERVED PRECIPITATION

January 12 – 18, 1992



DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

January 12 – 18, 1992

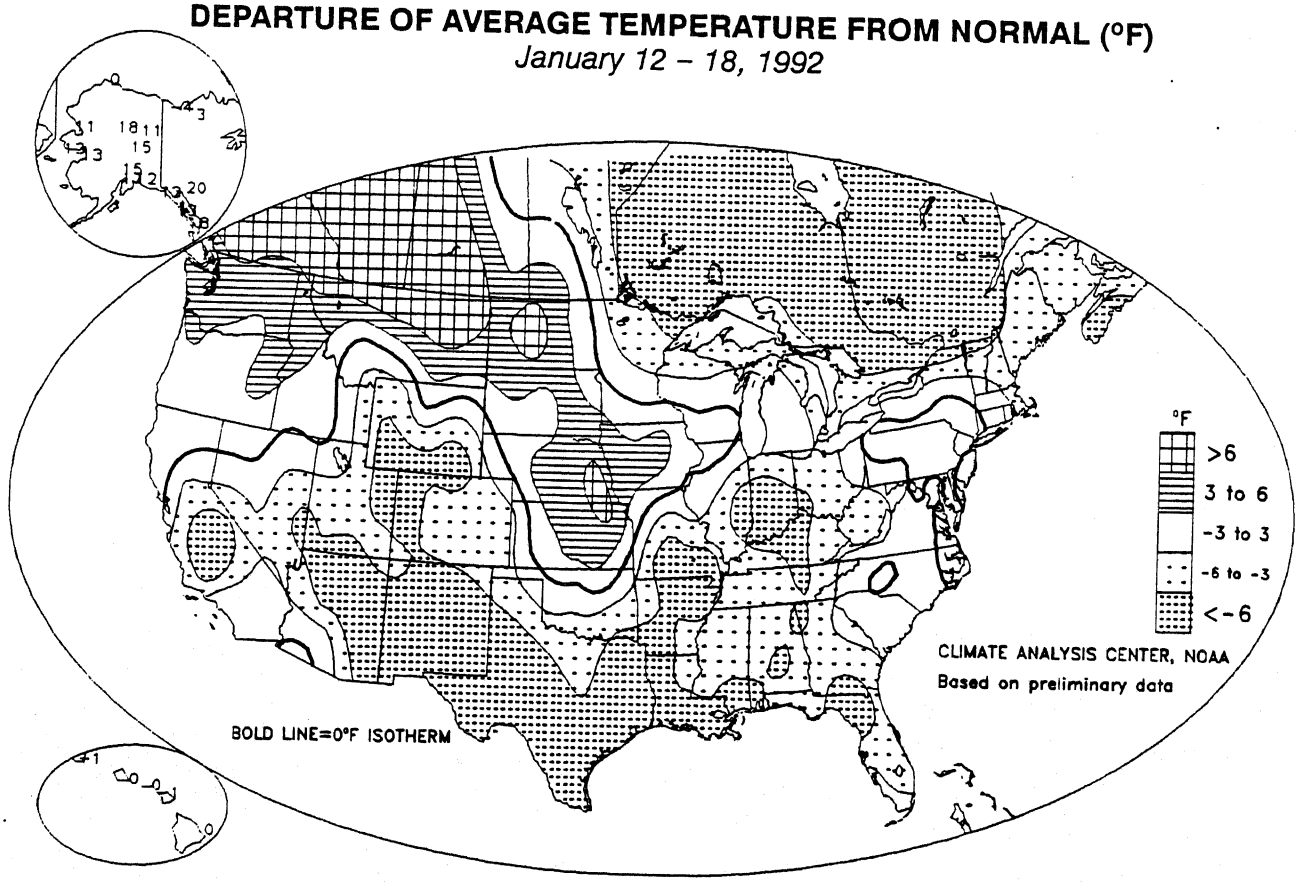
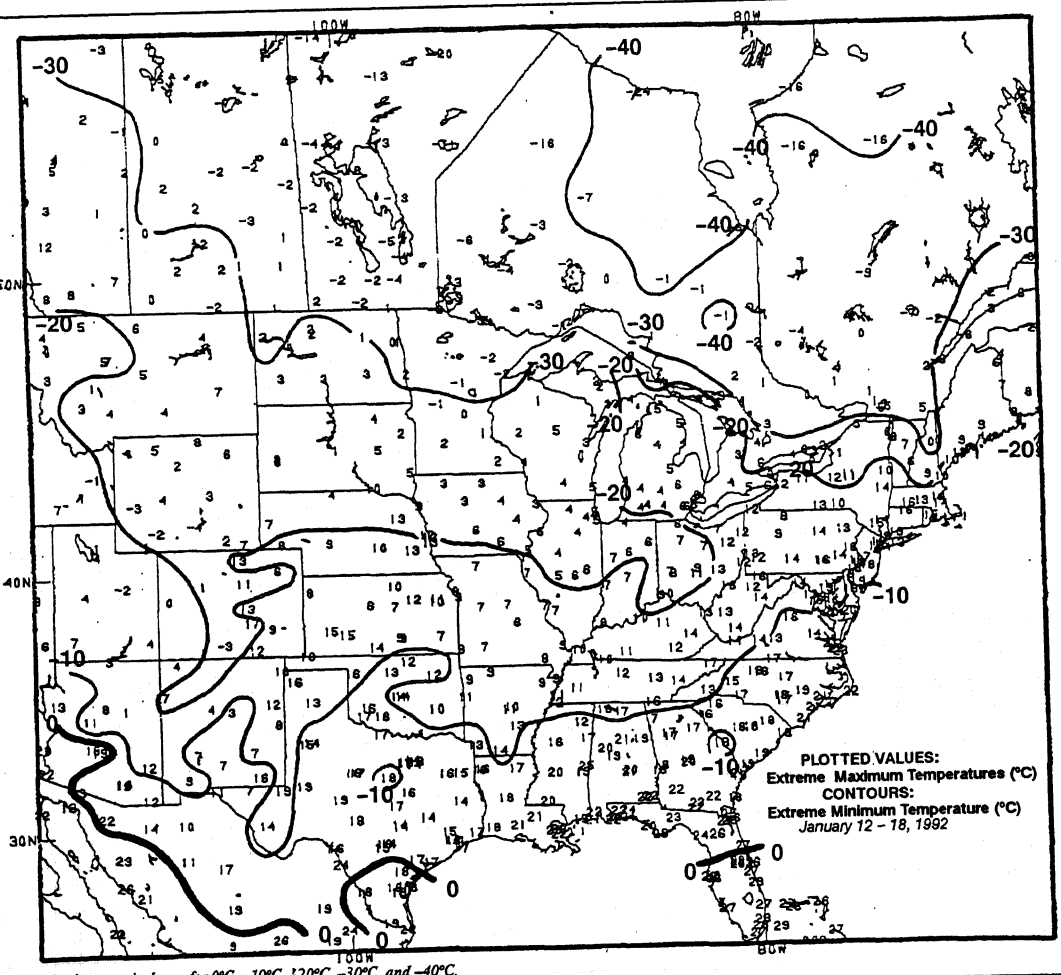


TABLE 2. *SELECTED STATIONS WITH TEMPERATURES AVERAGING 9.0°F OR MORE ABOVE NORMAL FOR THE WEEK OF JANUARY 12 – 18, 1992*

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
GULKANA, AK	+25.9	16.7	NORTHWAY, AK	+14.5	-7.6
ILIAMNA, AK	+20.8	35.0	MCGRATH, AK	+14.5	3.9
KING SALMON, AK	+20.3	32.9	NOME, AK	+13.4	19.5
KENAI, AK	+19.6	29.4	CORDOVA/MILE 13, AK	+13.1	34.3
ANIAK, AK	+19.6	18.6	SITKA, AK	+13.0	42.6
BETTLES, AK	+18.7	7.6	YAKUTAT, AK	+13.0	36.1
ANCHORAGE, AK	+17.7	29.7	VALDEZ, AK	+12.7	30.3
BIG DELTA, AK	+15.6	9.1	BETHEL, AK	+12.7	17.9
HOMER, AK	+15.5	36.4	KOTZEBUE, AK	+11.4	8.9
FAIRBANKS, AK	+15.5	3.0	HAVRE, MT	+11.0	22.3
TALKEETNA, AK	+15.3	23.7	GLASGOW, MT	+9.4	17.1
JUNEAU, AK	+15.1	36.5			

TABLE 3. *SELECTED STATIONS WITH TEMPERATURES AVERAGING 8.0°F OR MORE BELOW NORMAL FOR THE WEEK OF JANUARY 12 – 18, 1992*

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
ALAMOSA, CO	-14.9	0.2	PALACIOS, TX	-8.8	44.3
KINGSVILLE NAS, TX	-12.3	48.1	ALICE, TX	-8.7	46.0
WINSLOW, AZ	-10.5	21.5	LARAMIE, WY	-8.6	11.7
GRAND JUNCTION, CO	-9.5	15.6	MCALLEN, TX	-8.6	50.1
CLOVIS/CANNON AFB, NM	-9.4	27.5	MT WASHINGTON, NH	-8.5	-3.4
MIDLAND, TX	-9.4	33.8	BROWNSVILLE, TX	-8.3	51.8
BAKERSFIELD, CA	-9.3	38.6	DEMING, NM	-8.1	33.2
LAREDO, TX	-9.2	46.6	DOUGLAS, AZ	-8.0	36.8
ROSWELL, NM	-9.1	29.8	FRESNO, CA	-8.0	37.1
ALBUQUERQUE, NM	-8.9	25.8	JUNCTION, TX	-8.0	38.7
PRESCOTT, AZ	-8.9	28.8			

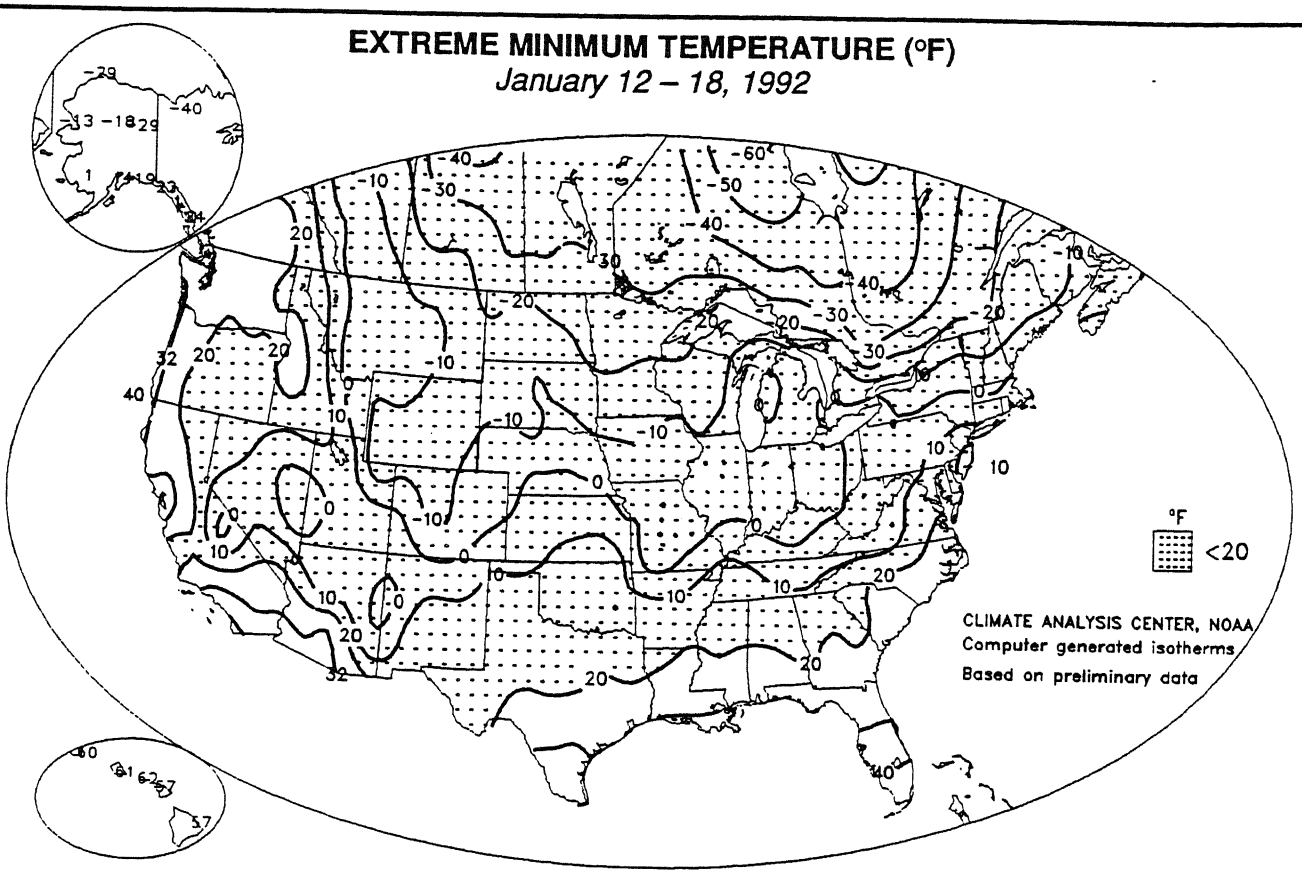


Isotherms only drawn for 0°C, –10°C, –20°C, –30°C, and –40°C.

A blast of frigid Arctic air followed a mild start to the week across central and eastern North America, generating weekly temperature ranges of 20°C to 35°C. After readings exceeding 10°C swept as far north as the central Great Plains and southern New England, the sudden blast of cold air sent the mercury below –20°C throughout the regions. As the week drew to a close, Gulf moisture was forced northward by a weak upper-level disturbance, generating moderate to heavy snow from northern Texas eastward to the Carolinas' coastline. Four to eight inches of heavy, wet snow buried central portions of Mississippi, Alabama, and Georgia.

EXTREME MINIMUM TEMPERATURE (°F)

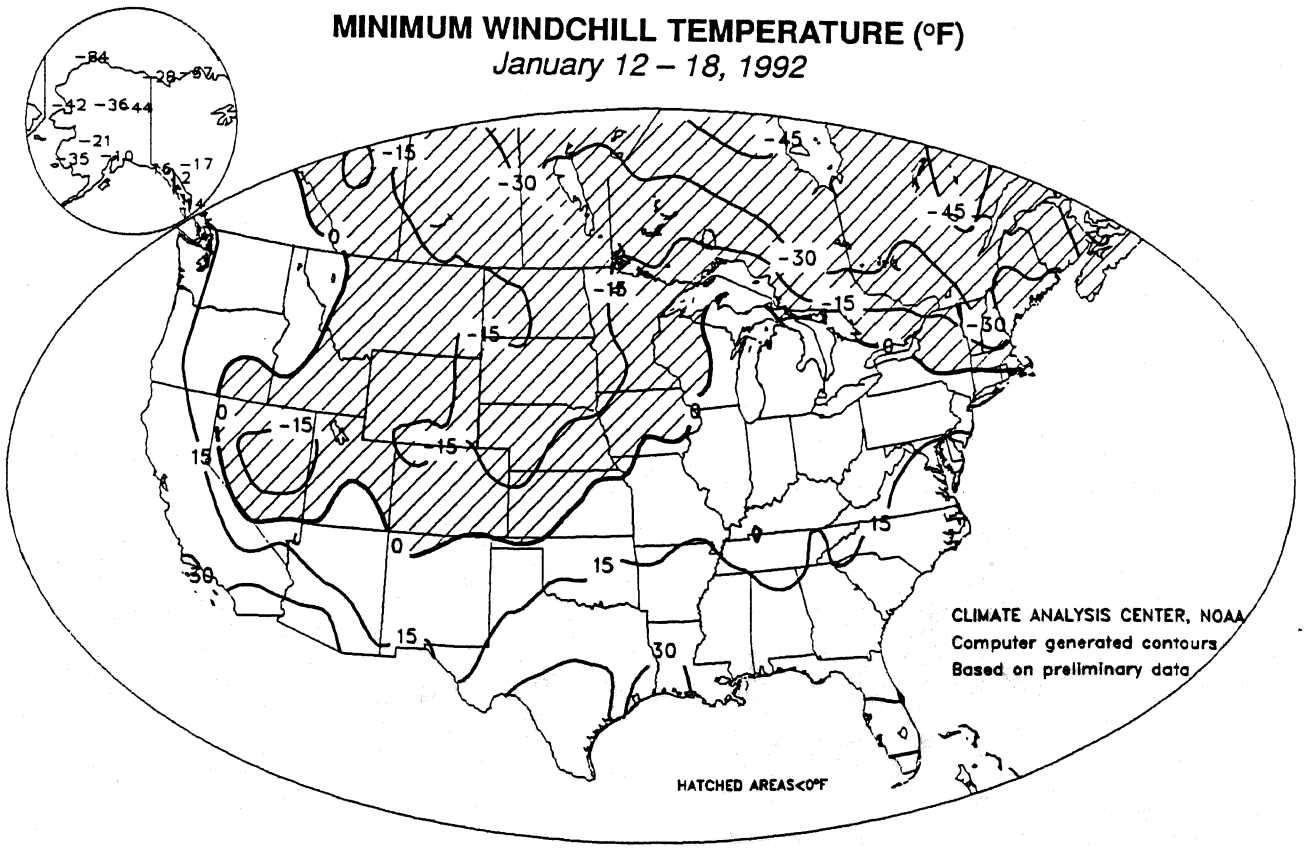
January 12 – 18, 1992



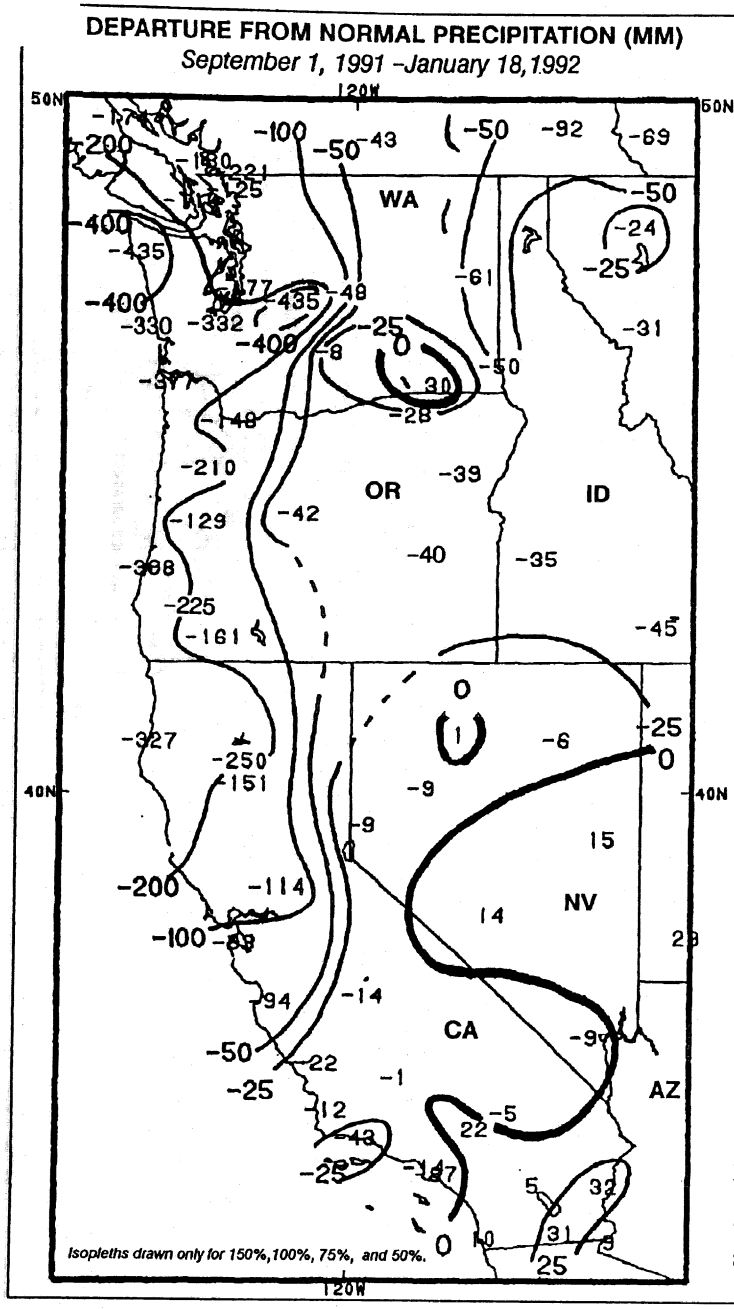
A blast of cold Arctic air plowed through the central and eastern U.S., bringing subzero readings as far south as the middle Mississippi Valley (top). Gusty winds accompanied the cold wave in much of the Plains, Great Lakes, and New England, sending wind chills below – 30°F in the latter region (bottom).

MINIMUM WINDCHILL TEMPERATURE (°F)

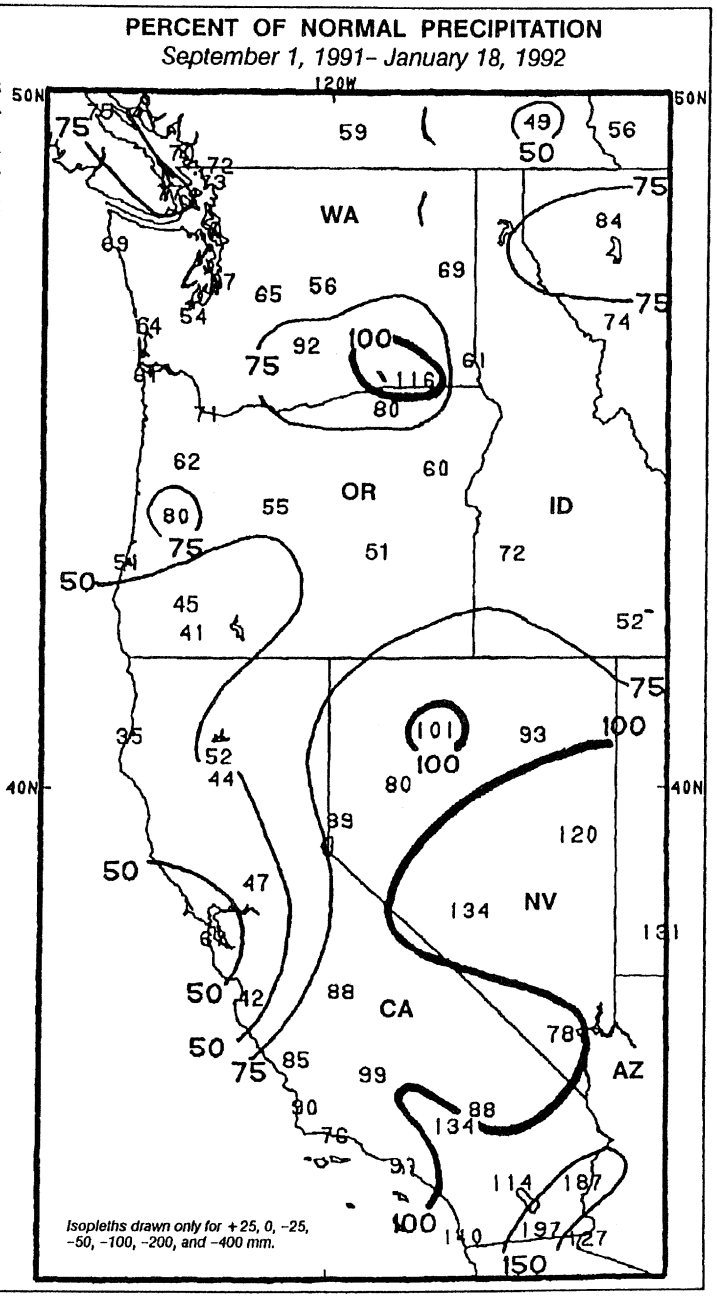
January 12 – 18, 1992



GLOBAL CLIMATE HIGHLIGHTS FEATURE

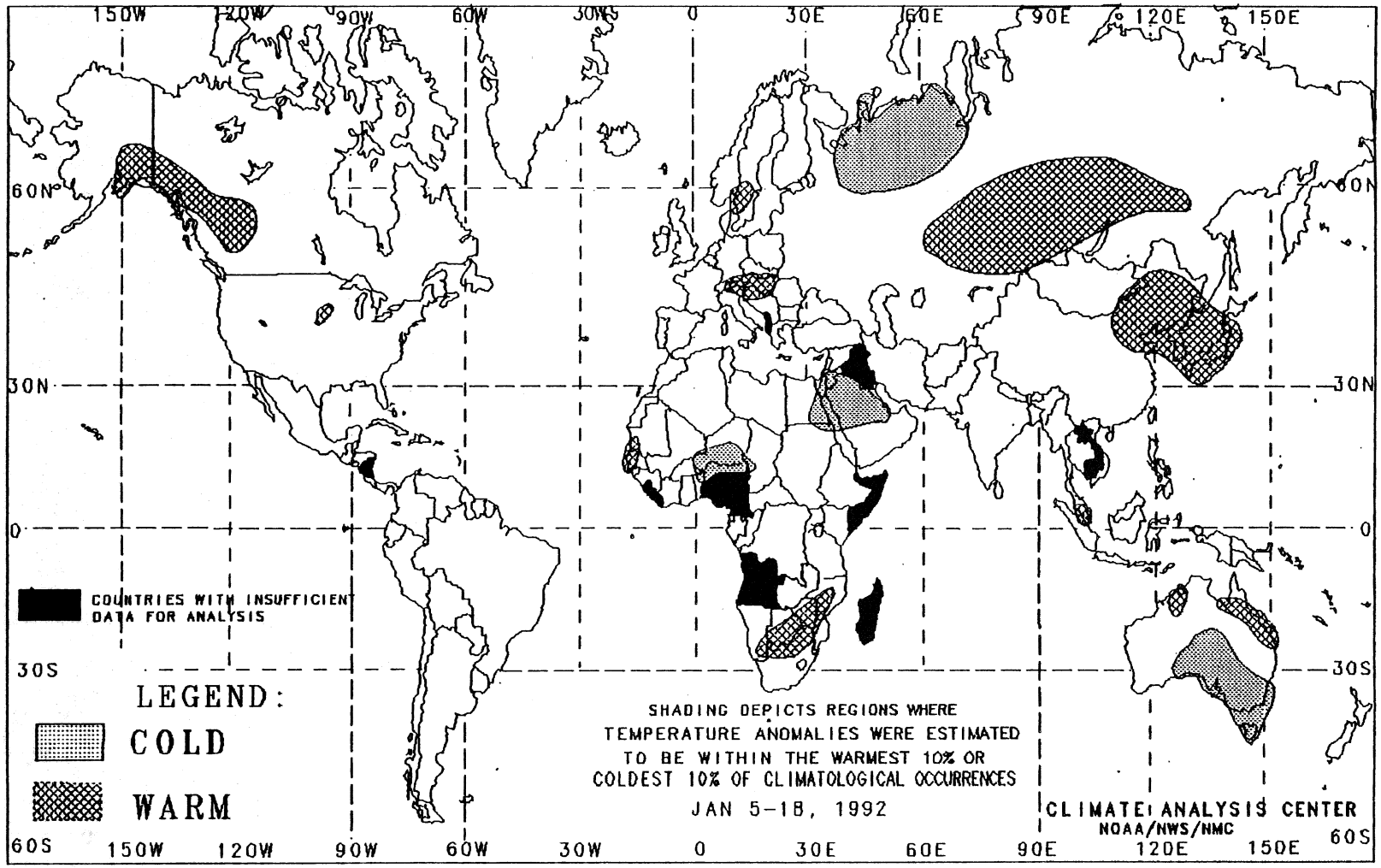


Despite moderate to heavy rains during the last half of December 1991 and early January 1992 in southeastern sections of the Far West, most of the region has observed a sixth consecutive abnormally dry start to the wet season. Much of the area from central California northward along the West Coast has recorded deficits exceeding 100 mm since the rainy season began, with portions of Washington receiving 400–450 mm less than normal (left). In contrast, a series of Pacific Ocean storms, fueled by an unusually strong sub–tropical jet stream, has generated above normal precipitation totals across the deserts of California and Arizona as well as through the southern two–thirds of Nevada, where most locations have recorded 115%–190% of normal (right). The precipitation in central Nevada has helped replenish depleted reservoirs somewhat, but dryness has unfortunately affected areas that are critical to the region's water supply, particularly the Sierra Nevadas (where springtime melting of mountain snowpack is critical to much of Nevada's water supply) and northern California (which provides most of the state with water since total precipitation is typically much lower to the south).



2–WEEK GLOBAL TEMPERATURE ANOMALIES

JANUARY 5 – 18, 1992



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty–four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

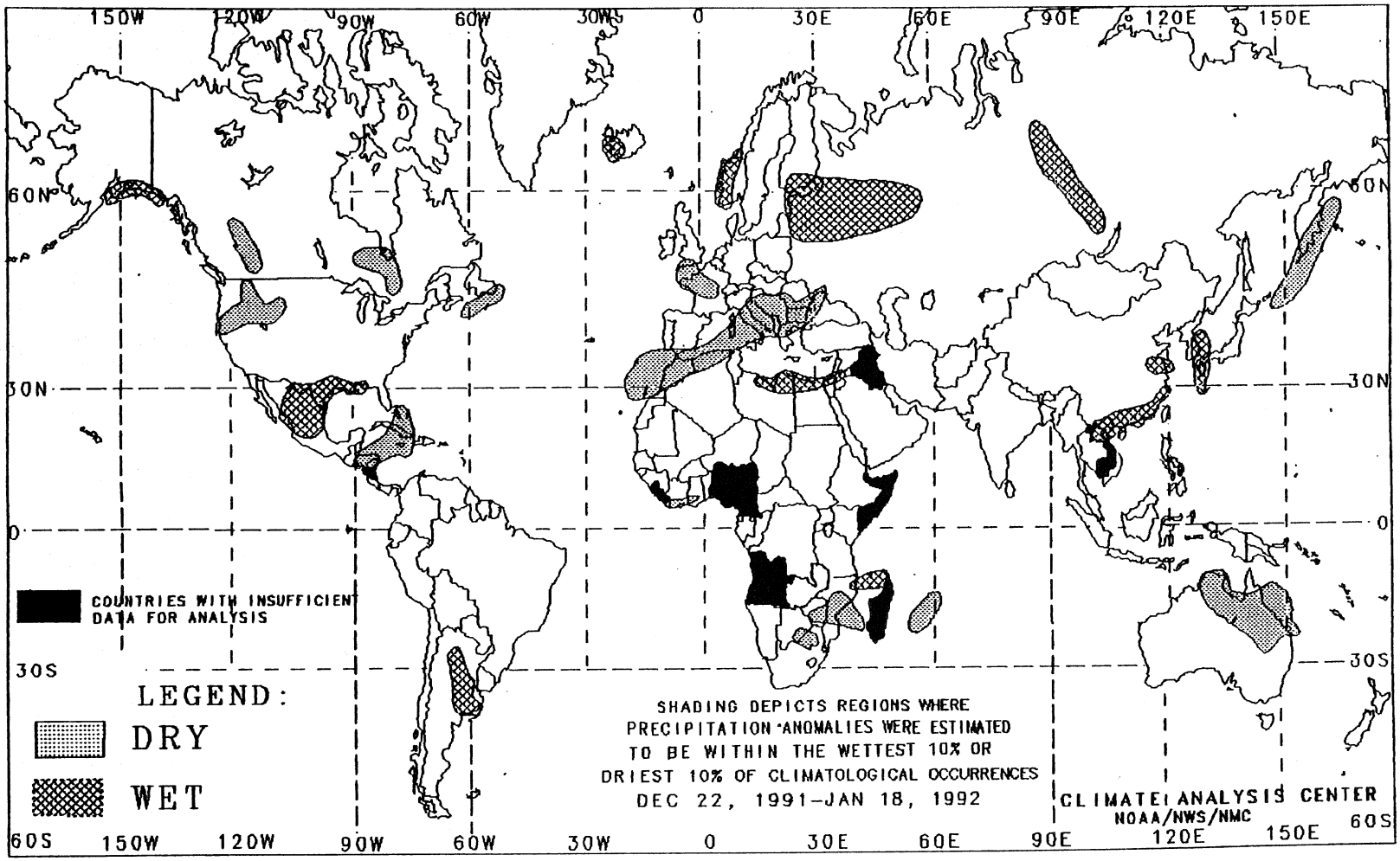
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

4–WEEK GLOBAL PRECIPITATION ANOMALIES

DECEMBER 22 , 1991 – JANUARY 18, 1992



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

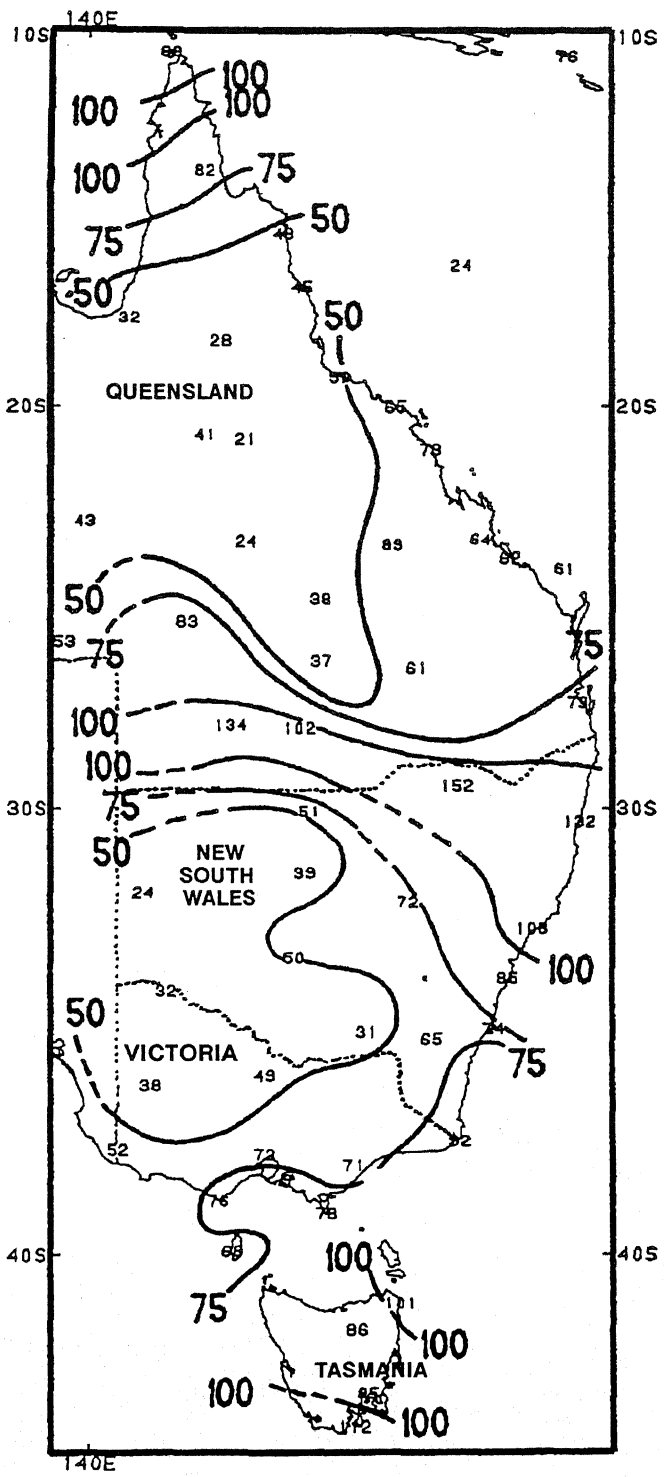


FIGURE 1. Percent of Normal Precipitation, October 1, 1991 - January 18, 1991 [100 days]. At least 88 days (80%) with sufficient reports were required for inclusion. Isopleths drawn only for 50%, 75%, and 100%. *Most of eastern Australia has endured an unusually dry rainy season, with much of Queensland, western New South Wales, and northern Victoria recording less than half of normal rainfall.*

SPECIAL CLIMATE SUMMARY

CLIMATE ANALYSIS CENTER,NMC
NATIONAL WEATHER SERVICE, NOAA

UPDATES ON SOUTHERN HEMISPHERE RAINY SEASON

The rainy season typically commences during the spring months (September-November), normally reaches a maximum during the summertime (December-February), and gradually diminishes during the early autumn across portions of the Southern Hemisphere. This is true for much of northern and eastern Australia, southeastern South America, and southern Africa. Conversely, the dry season typically occurs during the late fall, winter, and early spring months. The exceptions to this include southwestern Africa and southwestern Australia, where there is a winter precipitation maximum, and southeastern Australia, eastern Uruguay, and extreme southern Brazil, where rainfall is more evenly distributed throughout the year.

The spring/summer rainfall maximum was depicted in the Weekly Climate Bulletin #90/48 (dated 12/1/90) on pages 10-12. A large majority of the aforementioned areas normally receive over 75% of their annual precipitation during October-March, with parts of extreme northern Australia, south-central Brazil and northwestern Argentina, and much of south-central Africa recording more than 90% of the mean yearly rainfall during the same 6-month period. As a result, it is critical that adequate and timely rainfall occurs in these areas during this time of the year for agricultural and hydrological interests since significant precipitation does not usually fall during the cool season (April-September).

Another factor that usually has an impact on the short-term climate of the Southern Hemisphere (and the world) is the current low-index (warm) ENSO (El Nino-Southern Oscillation) event (refer to WCB#91/41, pages 13-14). Past studies by Climate Analysis Center scientists have identified regions where significant anomalous climatic responses to an El Nino are most likely. The maps (Figure 6) depict these areas in the Southern Hemisphere, and the most likely months of occurrence.

Australia: During low-index (warm) ENSO episodes, rainfall shortages are typically observed from central Sumatra eastward through New Guinea during June-November and across southeastern Australia from May through October. The eastern Australian wet season, typically commencing around early October, will then start out slowly across northern and eastern parts of the continent, bringing abnormally low September - March rainfall totals to the region, while longer-term (March - February) deficits accumulate in central Australia. With one notable exception, all of these patterns have been observed to some extent during the 1991-92 season.

A serious drought plagued the aforementioned sections of Indonesia through the Southern Hemisphere's Winter, causing a decrease in crop production and engendering the development of several large wildfires. Meanwhile, May brought abnormally light

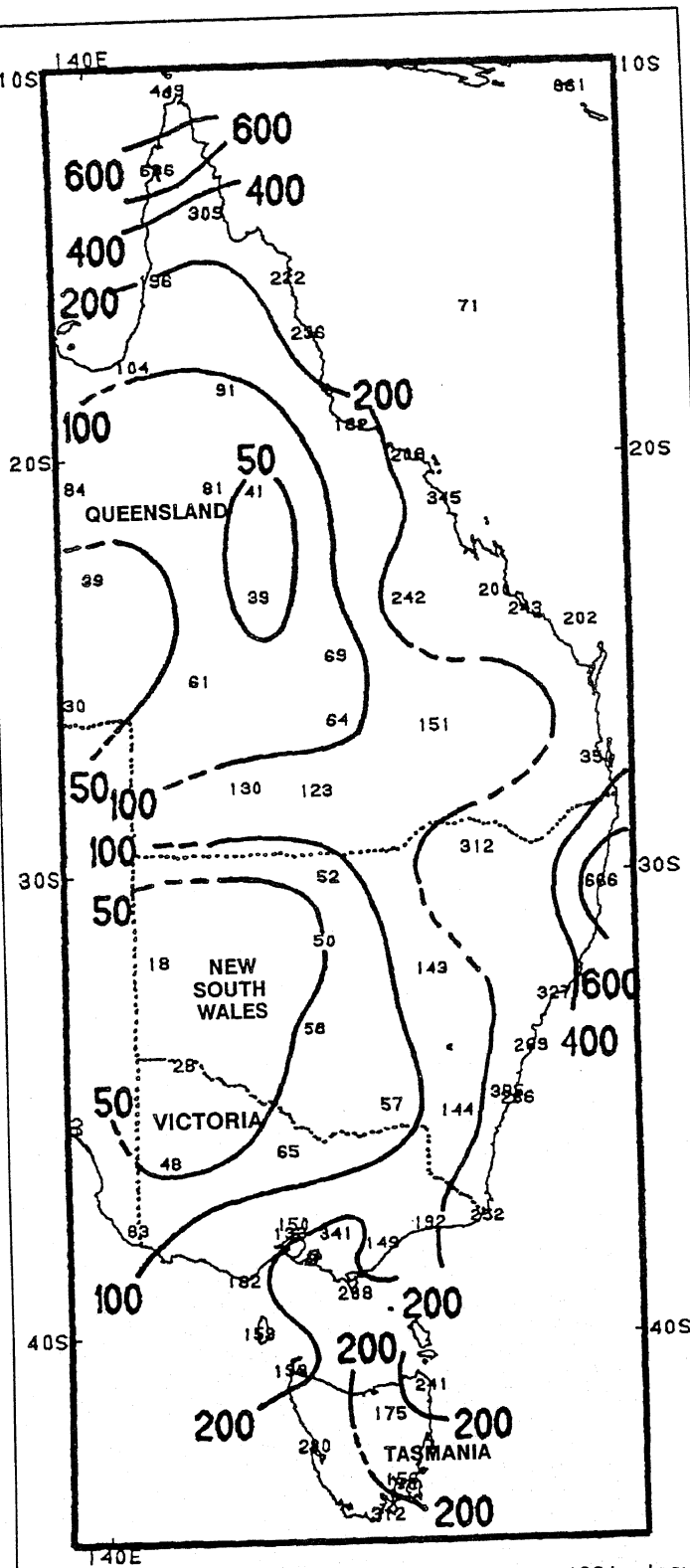


FIGURE 2. Total Precipitation (mm), October 1, 1991 – January 18, 1992 [100 days]. At least least 88 days (80%) with sufficient reports were required for inclusion. Isopleths drawn only for 50, 100, 200, 400, and 600 mm. *Less than 200 mm of rain has dampened most of eastern Australia, although 400 – 650 mm has soaked parts of the northern and eastern fringes of the continent.*

Australia during December 8–14, 1991. According to press reports, some locations in southern Queensland were deluged by up to 200 mm of rain in 9 hours, forcing several evacuations, washing out numerous bridges, and generating spotty flash flooding. In addition, Tropical Storm Mark swept across the northern Cape York Peninsula during early January, bringing 100–300 mm of rain to some lo- cations. Rainfall has been slightly more consistent in southeastern Queens- land, northeastern New South Wales, southern and eastern Tasmania, and Victoria, but most locations through the eastern half of the continent, including the primary crop regions, have measured well below normal rainfall. According to press reports, this growing season will probably yield the lowest sugar cane production in fifteen years and the smallest wheat output since the severe drought of 1982–83, all of which may cause the nation to experience its first decline in export revenue since 1980–81. In addition, drought-generated low-volume, sluggish streamflows in several critical rivers has allowed poisonous algae to contaminate drinking water in parts of New South Wales.

Southern Africa: According to the ENSO signal in southern Africa, abnormal dryness and warmth are usually experienced during the late spring, summer, and fall months across much of Madagascar, Mozambique, northeastern South Africa, Zimbabwe, eastern Botswana, southeastern Zambia, and Malawi. Since October 1, conditions have generally followed the expected ENSO patterns in most of Zimbabwe, southern Mozambique, and northeastern South Africa, where subnormal rainfall and above normal temperatures have created adverse growing conditions. Much of this area has received under 200 mm of rain during the past 3 1/2 months (Figure 5), or less than 75% of normal (front cover).

According to reports, Zimbabwe has been particularly hard-hit this year, with the current drought coming on the heels of a poor season last year. The lack of adequate rain and high temperatures have killed thousands of cattle, scorched crops, created severe water shortages, and threatened at least two major cities. Farther south, reports from the South African Maize Board stated that widespread rains and lower temperatures were needed soon to prevent irreversible drought damage to the country's 1991-92 crop. Fortunately, recent heavy rains (25–50 mm) finally fell on most of Zimbabwe and southern Mozambique during Jan. 19–22 (not reflected in Figure 5 and front cover).

In contrast, near to above normal rains have fallen across most of central and western South Africa, eastern Namibia, western Botswana, northern Mozambique, and probably Zambia (based upon supplemental data and news stories). According to reports from Zambia, a favorable rainfall pattern and increased corn plantings by commercial farmers have raised hopes for a bumper 1992 maize crop.

Southeastern South America: Expected ENSO signals in southeastern South America are above normal summer rainfall in eastern Argentina, Uruguay, and extreme southern Brazil, and above normal May–April temperatures across most of southeastern Brazil. Not surprisingly, this year's rainy season got off to an early start, with an unusually wet September in Uruguay and eastern Argentina. Widespread and frequent rains continued in the area during October, gradually expanded northward and westward during November, and increased during December. As depicted in Figure 3, much of the region has accumulated large rainfall totals (Figure 4) and experienced near to above normal rainfall since October 1 (Figure 3). Temperatures have generally been below normal in Argentina and Bolivia and somewhat above normal in southeastern Brazil since the late fall.

Unfortunately, the copious rainfall delayed plantings and produced severe flooding in portions of northern Argentina, damaging harvestable wheat and linseed and recently-sown coarse grains and oilseeds in the provinces of Buenos Aires, Cordoba, and Santa Fe, according to press reports. In Brazil, the western and northern suburbs of Rio de Janeiro were also hit with early January torrential downpours that resulted in flash flooding, mudslides, power outages, severe property damage, and the loss of several lives. Additionally, flash floods,caused by over 300 mm of rain in 2 hours, swept through the northern Argentine town of San Carlos de Minas when a dam on the Noguine River burst, taking dozens of lives. Fortunately, some recent relief has occurred since mid-January thanks as dry weather prevailed over much of northern Argentina.

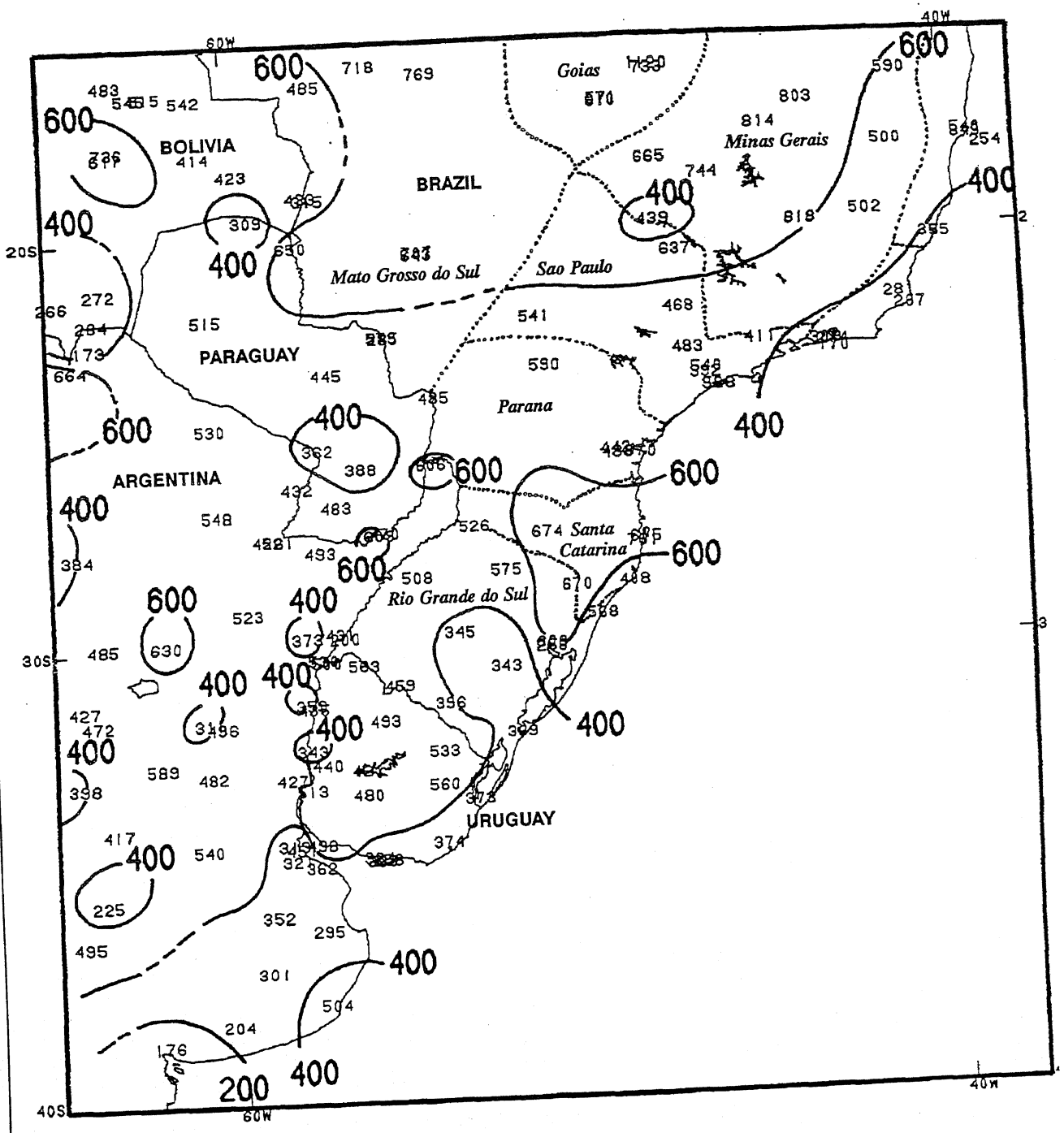


FIGURE 4. Total Precipitation (mm), October 1, 1991 – January 18, 1992 [110 days]. At least 88 days (80%) with sufficient reports were required for inclusion. Isopleths drawn only for 200, 400, and 600 mm. *Most locations have measured 300 – 700 mm of rain since the wet season began. The highest totals, except for those along the southern fringes of the Bolivian and Brazilian rainforests, were recorded in eastern Santa Catarina and portions of northern Argentina, where flooding has been reported.*

Southern Hemisphere Temperature and Precipitation Anomaly Correlations During Low – Index (Warm) ENSO Episodes

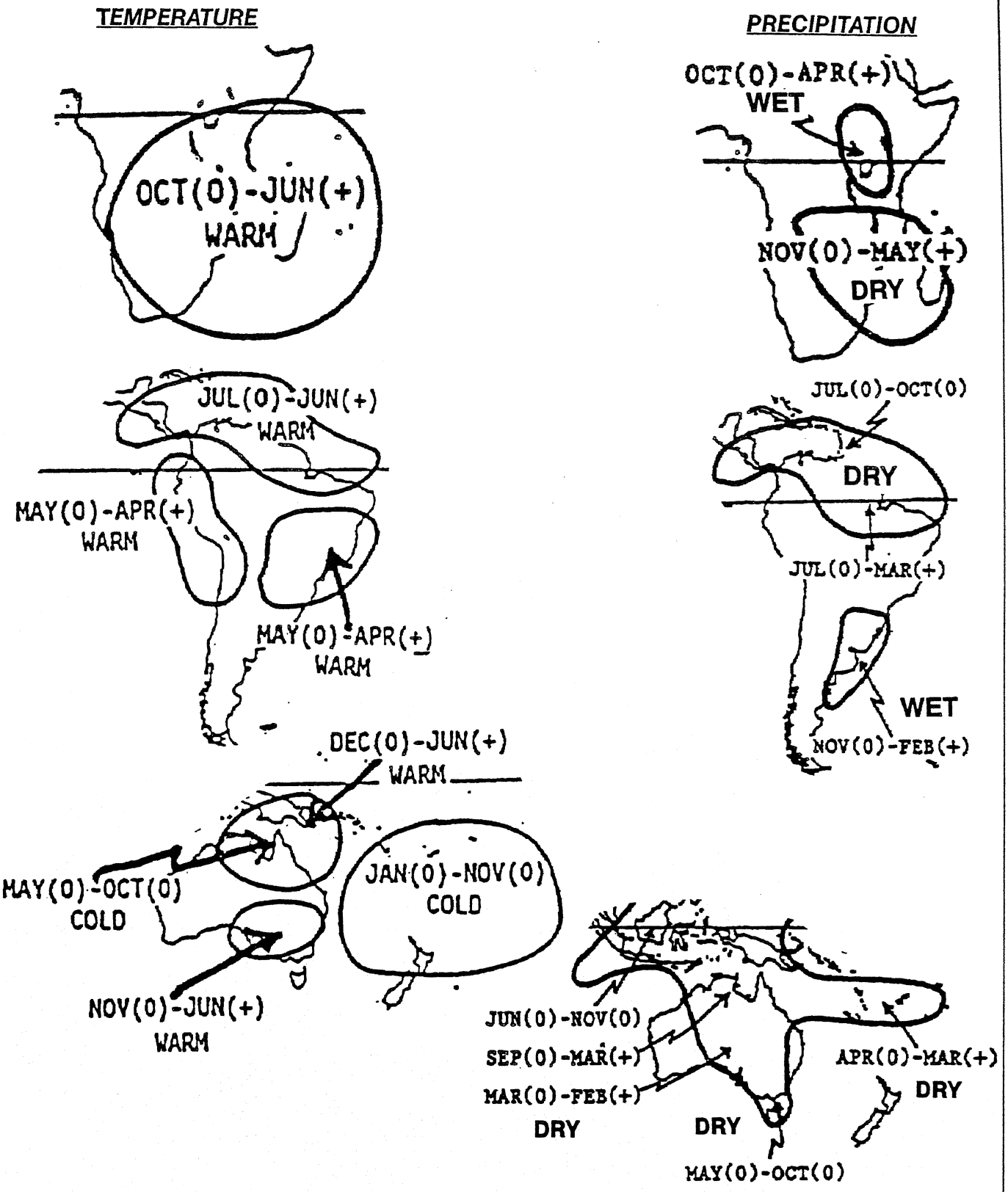
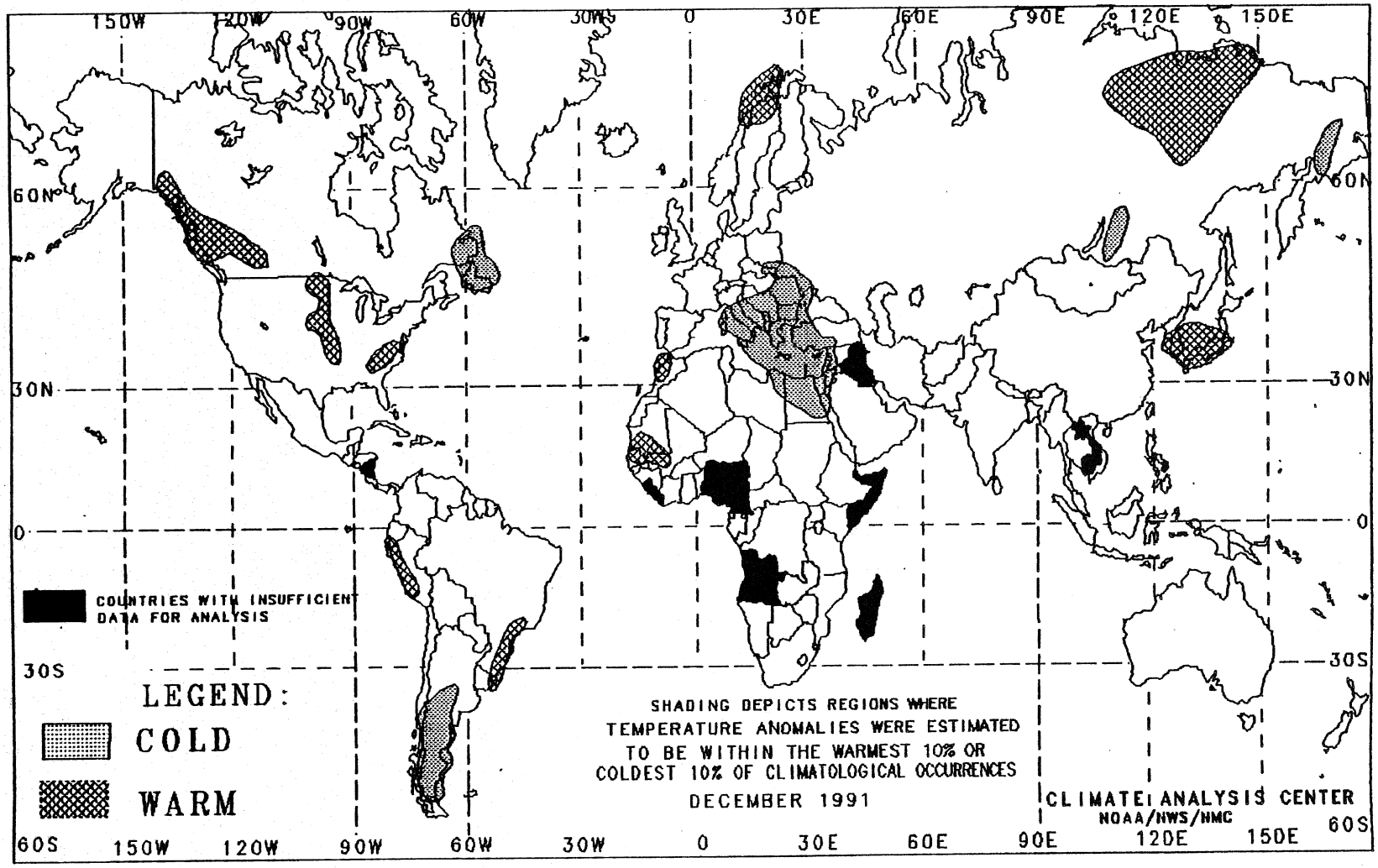


FIGURE 6. Temperature and Precipitation Anomaly Correlations in the Southern Hemisphere During Low-Index (warm) ENSO Episodes. *All of the wet-season precipitation anomalies above have been observed to some extent during 1991– 1992, although the pattern during the 1991 Southern Hemisphere winter did not correspond as strongly to typical "El Nino" responses.*

MONTHLY GLOBAL TEMPERATURE ANOMALIES

DECEMBER 1991



The anomalies on this chart are based on approximately 2500 observing stations for which at least 26 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty–four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warM anomalies.

Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of one month temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

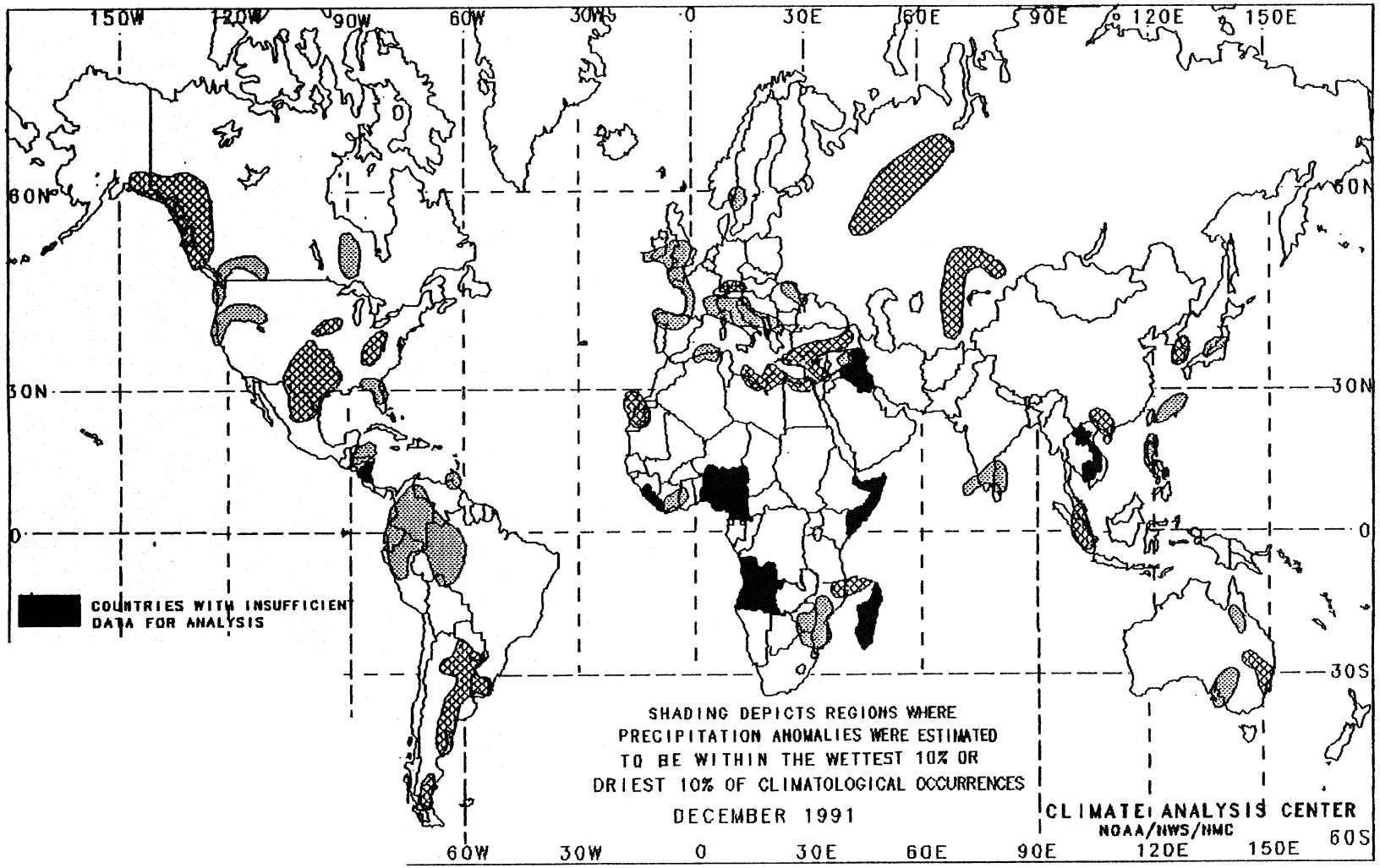
PRINCIPAL TEMPERATURE ANOMALIES

DECEMBER 1991

REGIONS AFFECTED	TEMPERATURE AVERAGE (°C)	DEPARTURE FROM NORMAL (°C)	COMMENTS
NORTH AMERICA			
Southwestern Canada	-3 to +7	+2 to +7	MILD - 9 to 10 weeks
Central United States	-4 to +7	+2 to +5	MILD - 6 to 8 weeks
Southern Appalachians	+7 to +14	+2 to +3	Very mild early and late in December
Extreme Southeastern Canada	-18 to -4	-3 to -6	COLD - 6 to 10 weeks
SOUTH AMERICA AND EASTERN PACIFIC			
Coast of Peru	+22 to +25	+2 to +3	WARM - 5 to 7 weeks
Southern South America	+10 to +20	Around -2	COOL - 2 to 4 weeks
Southeastern Brazil and Eastern Uruguay	+22 to +23	Around +2	WARM - 4 to 10 weeks
EUROPE AND THE MIDDLE EAST			
Northern Norway and Northern Sweden	-9 to +3	+2 to +6	Very mild first half of December
Southeastern Europe and the Middle east	-4 to +12	-2 to -5	COLD - 2 to 10 weeks
AFRICA			
Egypt and Libya	+12 to +14	-2 to -4	COOL - 4 to 6 weeks
Morocco	+13 to +15	+3 to +6	WARM - 10 weeks
Senegal and Western Mali	+25 to +28	+2 to +3	WARM - 2 to 5 weeks
ASIA			
North-Central Siberia	-35 to -27	+5 to +7	MILD - 4 to 18 weeks
South-Central Siberia	-31 to -22	-4 to -5	COLD - 6 weeks
Eastern Siberia	-40 to -17	-3 to -7	COLD - 5 weeks
Japan and Korea	+6 to +13	+2 to +3	WARM - 4 to 8 weeks
AUSTRALIA AND WESTERN PACIFIC			
No Significant Temperature Anomalies			

MONTHLY GLOBAL PRECIPITATION ANOMALIES

DECEMBER 1991



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The chart shows general areas of one month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

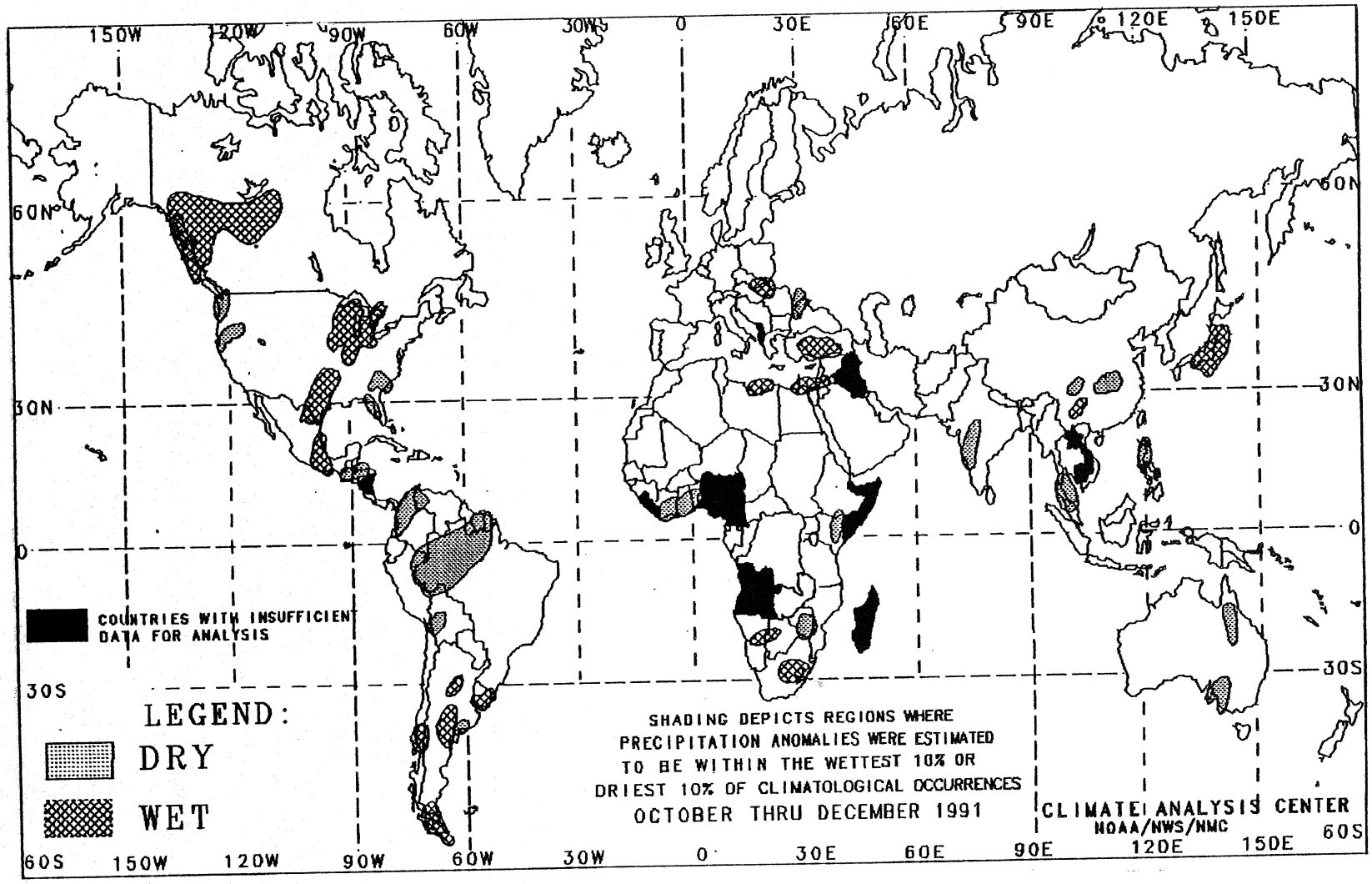
PRINCIPAL PRECIPITATION ANOMALIES

DECEMBER 1991

REGIONS AFFECTED	PRECIPITATION TOTAL (MM)	PERCENT OF NORMAL	COMMENTS
NORTH AMERICA			
Southeastern Alaska and West-Central Canada	39 to 592	153 to 250	WET - 4 weeks
Southwestern Canada	1 to 96	5 to 53	DRY - 8 to 9 weeks
Western Ontario	0 to 10	0 to 33	DRY - 7 to 10 weeks
Southern Oregon and Southern Idaho	4 to 168	9 to 57	DRY - 5 to 6 weeks
Eastern Nebraska and Southwestern Iowa	54 to 56	215 to 324	WET - 2 to 10 weeks
Central Appalachians	129 to 260	182 to 224	Heavy precipitation first half of December
South-Central United States and Northeastern Mexico	51 to 360	193 to 1195	WET - 5 to 10 weeks
Florida	6 to 40	13 to 35	DRY - 10 to 14 weeks
Honduras	3 to 97	3 to 26	DRY - 5 to 8 weeks
SOUTH AMERICA AND EASTERN PACIFIC			
Northeastern Venezuela	13 to 40	17 to 29	DRY - 5 weeks
Northwestern South America	3 to 143	3 to 55	DRY - 6 to 9 weeks
East-Central South America	101 to 412	182 to 687	WET - 4 to 10 weeks
Extreme Southern Argentina	52 to 126	330 to 460	WET - 10 weeks
EUROPE AND THE MIDDLE EAST			
Western Europe	8 to 37	9 to 36	DRY - 5 to 9 week
Southwestern Sweden	12 to 20	30 to 49	DRY - 7 weeks
Switzerland and Austria	179 to 464	194 to 345	WET - 2 to 5 weeks
South-Central Europe	0 to 54	0 to 42	DRY - 6 to 10 weeks
Romania	4 to 17	24 to 36	DRY - 9 weeks
Turkey and the Middle East	36 to 418	169 to 252	WET - 4 to 6 weeks
Syria	1 to 9	5 to 42	DRY - 10 weeks
AFRICA			
Northern Algeria	12 to 21	10 to 25	DRY - 10 weeks
Northern Libya and Northern Egypt	122 to 235	230 to 526	WET - 10 weeks
Canary Islands, Spanish Sahara, and Adjacent Mauritania	55 to 118	395 to 559	Heavy precipitation first half of December
Gulf of Guinea Coast	0 to 16	0 to 22	DRY - 4 weeks
Comoros and Northern Mozambique	303 to 612	174 to 351	WET - 2 to 10 weeks
South Africa, Zimbabwe, and Southern Mozambique	9 to 94	10 to 36	DRY - 6 to 18 weeks
ASIA			
Western Siberia	54 to 75	199 to 273	WET - 4 to 9 weeks
Kazakhistan	50 to 136	234 to 533	WET - 4 to 6 weeks
Sri Lanka and Southern India	2 to 32	1 to 9	DRY - 6 to 8 weeks
South-Central China	59 to 61	286 to 387	WET - 2 to 4 weeks
Ryukyu Islands	23 to 32	16 to 27	DRY - 7 to 9 weeks
Central Japan	136 to 184	54 to 60	DRY - 4 weeks
South Korea	55 to 235	223 to 461	WET - 2 to 8 weeks
AUSTRALIA AND WESTERN PACIFIC			
Indonesia and Malaysia	253 to 529	146 to 230	WET - 2 to 6 weeks
Philippines	4 to 9	Around 4	DRY - 7 to 10 weeks
Northeastern Australia	2 to 11	3 to 9	DRY - 10 weeks
East-Central Australia	85 to 229	244 to 257	WET - 6 weeks
South-Central Australia	1 to 6	3 to 23	DRY - 8 weeks

3–MONTH GLOBAL PRECIPITATION ANOMALIES

OCTOBER – DECEMBER 1991

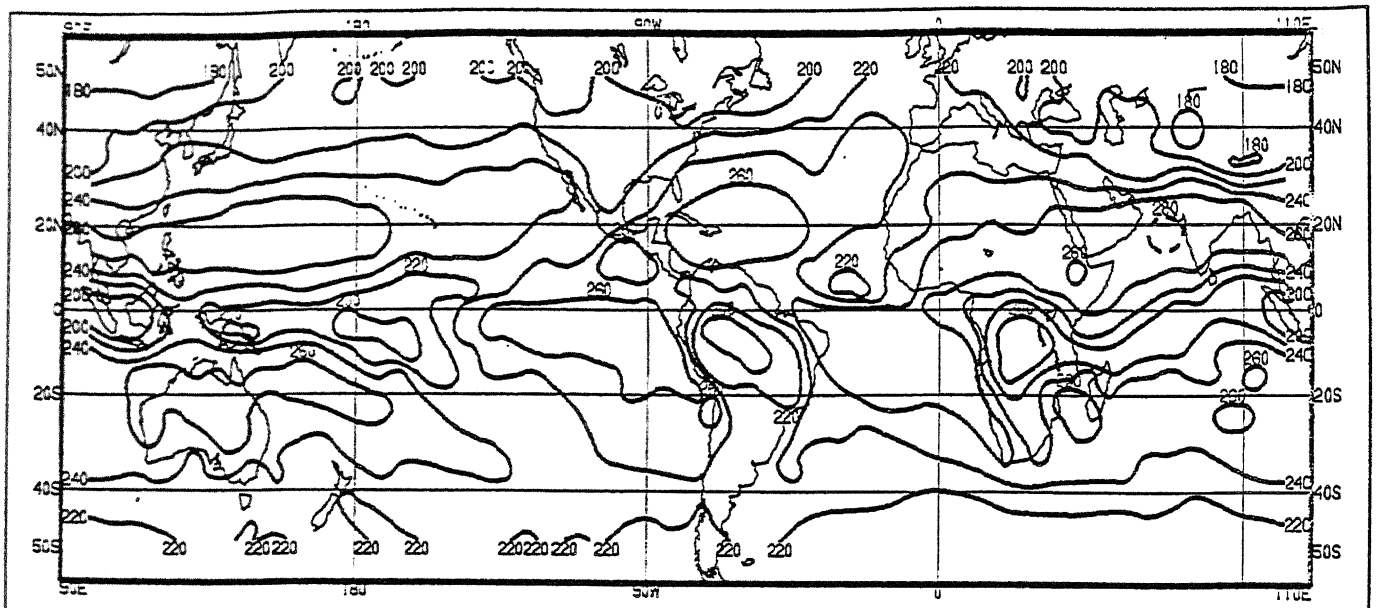


The anomalies on this chart are based on approximately 2500 observing stations for which at least 81 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the three month period is less than 50 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total three month precipitation exceeds 125 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of three month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

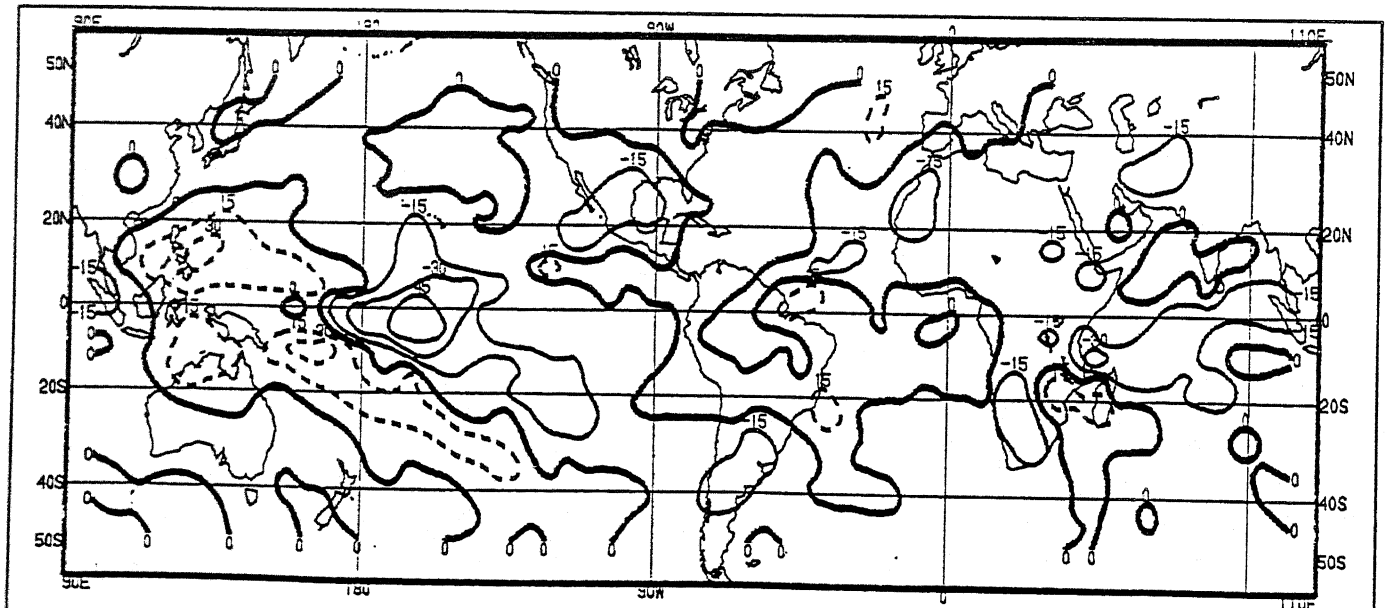


Monthly Mean Outgoing Long Wave Radiation (OLR) for December, 1991

EXPLANATION

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA-9 AVHRR IR window channel by NESDIS/SRL (top). Data are accumulated and averaged over 2.5° areas to a 5° Mercator grid for display. Contour intervals are 20 Wm^{-2}, and contours of 280 Wm^{-2} and above are dashed. In tropical areas (for our purposes 20°N - 20°S) that receive primarily convective rainfall, a mean OLR value of less than 200 Wm^{-2} is associated with significant monthly precipitation, whereas a value greater than 260 Wm^{-2} normally indicates little or no precipitation. Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non-convective, or in some tropical coastal or island locations, where precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitation amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1979 - 1988 base period mean. Contour intervals are 15 Wm^{-2}, while positive anomalies (greater than normal OLR, suggesting less than normal cloud cover and/or precipitation) are dashed and negative anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) are solid.



Monthly Mean Outgoing Long Wave Radiation (OLR) Anomaly for December, 1991